1.6 Let $\mathbf{A} = \mathbf{a}_x - \mathbf{a}_z$, $\mathbf{B} = \mathbf{a}_x + \mathbf{a}_y + \mathbf{a}_z$, $\mathbf{C} = \mathbf{a}_y + 2\mathbf{a}_z$, find:

(a) $\mathbf{A} \cdot (\mathbf{B} \times \mathbf{C})$

(c) $\mathbf{A} \times (\mathbf{B} \times \mathbf{C})$

a)

$$\bar{B} \times \bar{C} = \left|\begin{array}{ccc|cc} \hat{a}_x & \hat{a}_y & \hat{a}_z & \hat{a}_x & \hat{a}_y \\ 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 0 & 1 \end{array}\right.$$

$$= \hat{a}_x[1(2) - 1] + \hat{a}_y[0 - 1(2)] + \hat{a}_z[1(1) - 0]$$

$$= \hat{a}_x - 2\hat{a}_y + \hat{a}_z$$

$$\bar{A} \cdot (\bar{B} \times \bar{C}) = (\hat{a}_x - \hat{a}_z) \cdot (\hat{a}_x - 2\hat{a}_y + \hat{a}_z) = 1 - 1$$

$$\underline{\underline{\bar{A} \cdot (\bar{B} \times \bar{C}) = 0}}$$

c)

$$\bar{B} \times \bar{C} = \left|\begin{array}{ccc|cc} \hat{a}_x & \hat{a}_y & \hat{a}_z & \hat{a}_x & \hat{a}_y \\ 1 & 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 0 & 1 \end{array}\right.$$

$$= \hat{a}_x[1(2) - 1] + \hat{a}_y[0 - 1(2)] + \hat{a}_z[1(1) - 0]$$

$$= \hat{a}_x - 2\hat{a}_y + \hat{a}_z$$

$$\bar{A} \times (\bar{B} \times \bar{C}) = \left|\begin{array}{ccc|cc} \hat{a}_x & \hat{a}_y & \hat{a}_z & \hat{a}_x & \hat{a}_y \\ 1 & 0 & -1 & 1 & 0 \\ 1 & -2 & 1 & 1 & -2 \end{array}\right.$$

$$= \hat{a}_x[0(1) - (-1)(-2)] + \hat{a}_y[-1(1) - 1(1)] + \hat{a}_z[1(-2) - 0(1)]$$

$$\underline{\underline{\bar{A} \times (\bar{B} \times \bar{C}) = -2\hat{a}_x - 2\hat{a}_y - 2\hat{a}_z}}$$